

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Inventor(s): Laura Wills Mirkarimi Confirmation No.: 1183  
Application No.: 10/765,647 Examiner: Duy Vu Nguyen Deo  
Filed: January 26, 2004 Group Art Unit: 1792  
Title: METHOD FOR ETCHING HIGH ASPECT RATIO FEATURES IN III-V BASED COMPOUNDS FOR OPTOELECTRONIC DEVICES

Attorney Docket No.: 10030753-1

Commissioner for Patents  
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REPLY BRIEF

Sir:

This Reply Brief is in furtherance of Applicant's Notice of Appeal filed April 14, 2008 appealing the final rejection, dated December 13, 2007, of Claims 1-20, and is in response to the Examiner's Answer filed September 29, 2008.

I. Fathimulla's teachings of the use of CH4 and H2, in the alternative, may not be combined to show obviousness of the claimed invention.

In the Examiner's Answer, page 4, lines 18-21, it is argued as follows (emphasis added):

Appellant's argument that Fathimulla teaches away of using CH4 and H2 because they are recited by Fathimulla in the alternative is found unpersuasive because this is not teaching away but it just teaches a way of etching. There is no specific teaching from Fathimulla that CH4 and H2 can't be used together.

These comments, in the Examiner's Answer, in support of the rejection argue that (i) the Fathimulla reference teaches the use of CH4 and H2 in the alternative, (ii) there is "no specific teaching" that the two gases "can't be used together", and (iii) the lack of such specific teaching against using them together amounts to a teaching that renders it obvious that they can be used together.

Applicants' attorney, undersigned, submits that this is not the correct standard for making an obviousness rejection. Rather, the correct standard for supporting an obviousness rejection is "teaching/suggestion/motivation" test ("TSM test"), taken in light of the Supreme Court's opinion in *KSR v. Teleflex*.

Under the TSM test, where teachings in distinct references are to be combined to make a showing of obviousness, there must be a teaching, suggestion or motivation to combine the references' distinct teachings, in order to arrive at the claimed invention. This is often found from language in the references.

Under KSR, the Supreme Court has stated that the "teaching/suggestion/motivation" test should not be applied narrowly or rigidly. Rather, an "expansive and flexible approach" should be used. (slip opinion, page 11, section II A, lines 3-4). However, the Supreme Court recognizes that the test is whether "it was obvious to a person of ordinary skill to combine" the respective teachings (p. 20, section B, lines 3-4 in the slip opinion). Here, we have the somewhat unusual situation in which the two distinct teachings happen to fall within the same reference.

This alternative teaching within the same reference invites the question: if there were a motivation to use two teachings together, why would the Fathimulla et al, authors of both teachings, not say so? Why would Fathimulla et al. mention both alternative teachings, within the same writing, but give no teaching or suggestion of using them together? The Examiner, by his own argument, acknowledges that there is not a teaching that they are used together. It is readily apparent that the answer is that Fathimulla et al. did not contemplate using them together.

Therefore, under the pre-KSR "teaching/suggestion/motivation" test, it would clearly be improper to combine these two alternative teachings, given the lack of teaching, suggestion or motivation.

Under KSR, the result properly should be the same. To hold otherwise would be to impose on Applicants the burden of "proving a negative", by finding a teaching that they "can't be used together." The TSM test, whether applied rigidly or flexibly, does not justify any such burden on the Applicants. Applicants' attorney submits that, rather, the proper conclusion is that these alternative teachings may not be combined to show obviousness.

II. The teachings of the use of the combination of gases, given in Fathimulla and Pearton, may not be combined to show obviousness of the claimed invention.

In the Examiner's Answer (page 4, lines 7-11), it is alleged that

None of appellants' arguments have addressed or traversed the motivation, (for adding H<sub>2</sub> from Pearton's teaching into Fathimulla's composition of CH<sub>4</sub> and HBr) that Pearton teaches addition of the H<sub>2</sub> to the gas mixture provide a much smoother surfaces and Fathimulla teaches that other combinations of gas composition can be used to give a smooth vertical feature (col. 3, line 65-68).

However, in the Brief on Appeal, Applicants have argued that the weight of the teachings argue against a teaching, motivation or suggestion to combine the references.

As noted in the Appeal Brief, the combination of the references is discouraged, based on the discussion of etch rates, as follows:

.... *Pearton, et al.* discourages the use of methane/ H<sub>2</sub> mixtures. Notably, the reference states:

"The major limitation with the use of CH<sub>4</sub>/H<sub>2</sub> discharges is the slow etch rates... [and] Several attempts to enhance the CH<sub>4</sub>/H<sub>2</sub> etch rates by addition of Cl<sub>2</sub> (Ref. 9) and PCl<sub>3</sub> (Ref. 10) have been reported, but relatively high self-biases were needed to achieve practical etch rates and careful seasoning of the reactor necessary for reproducible results."

The reference then touts the use of an HI/H<sub>2</sub> discharge as having much faster etch rates than CH<sub>4</sub>/ H<sub>2</sub>. Accordingly, Applicants respectfully submit that one of ordinary skill in the art would be discouraged from seeking to introduce methane and H<sub>2</sub> in the RIE reactor as set forth in claims 1 and 20.

Therefore, the applied reference to *Pearton, et al.* teaches away and cannot serve as a reference in a rejection of the claims under present consideration. (Applicants refer to page 838, left column of the reference to *Pearton, et al.* for support for their position.)

As also noted in the Appeal Brief, a further disincentive from combining Fathimulla with *Pearton* has to do with the combination of gases used:

.... *Pearton, et al.* explicitly discourages the combination of CH<sub>4</sub> and H<sub>2</sub>. ....at page 839, right column, *Pearton, et al.* states (again, with emphasis added):

"With CH<sub>4</sub>/H<sub>2</sub> mixtures at high microwave powers, the InP surface becomes rapidly deficient in phosphorous, and the morphology for even small (< 2000 Å) etch depths is unacceptable."

So, if one were looking to supplement the two-gas mixture of HBr and CH<sub>4</sub> disclosed in *Fathimulla, et al.*, a study of *Pearton, et al.* would clearly discourage one from combining CH<sub>4</sub> and H<sub>2</sub>. Therefore, one skilled in the art would be discouraged from introducing the compounds HBr and CH<sub>4</sub> and H<sub>2</sub> as claimed.

In summary, Applicants' attorney submits that the teaching, motivation, or suggestion from the references, taken as a whole, is against combining them. Therefore, a person of ordinary skill in the art would not have found the claimed invention obvious over these references.

CONCLUSION AND PRAYER FOR RELIEF

For at least the reasons set forth above, Applicants respectfully submit that the rejection of claims 1 and 12 under 35 U.S.C. § 103 is improper and that claims 1 and 12 are patentable over the applied art. Moreover, and for at least the same reasons, the rejections of claims 2-11 and 13-20, which depend from claims 1 and 12, respectively, are also improper and these claims are patentable for at least the same reasons.

It is respectfully requested that the Board of Patent Appeals and Interferences reverse the Examiner's final rejection of Claims 1-20 so that this case may be allowed and pass to issue in a timely manner.

Respectfully submitted,

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